week. In the University of North Dakota, Prof. H. E. Simpson presents a four-hour semester course in meteorology, and a two-hour course in climatology. Credit for research work is offered. Finally, in George Washington University, Prof. W. L. Moore gives a course on applied meteorology, and Prof. W. J. Humphreys one on meteorological physics. Prof. Humphreys's course is for advanced students only.

With relation to the position of meteorology and its outlook for further development, it is to be regretted that there are only three universities in the country where research in meteorology is specifically encouraged, and that even the semblance of a thorough course in elementary meteorology is given at only one in ten of the institutions of higher learning in the country. Surely, the weather is of sufficient interest and importance to deserve individual representation in the curricula of most colleges and universities. Let us hope that without being forced to it, more institutions will have the experience of Muhlenberg College. Prof. I. M. Wright says: "During the S. A. T. C. I had 60 men in the course in meteorology and the work made such an appeal to the men that we are continuing it in the regular college curriculum."

METEOROLOGICAL OBSERVATIONS WHILE TRAVELING.

By ROBERT DEC. WARD.

[Abstract: Handbook of Travel, Harvard Univ. Press, 1917, pp. 451-472.]

Weather conditions are such ever-present and obvious controls of all outdoor activities that no one, least of all a traveler, can be unconscious of them. By devoting a few minutes a day to recording simple observations, every traveler, whether skilled in meteorological work or not, may not only make his own journey more worth while, but also add something definite and valuable to our knowledge of the meteorology of little known regions. The traveler who has never made a study of meteorology and who wishes to gain some general knowledge of the subject before he starts on his journey, may well read over one of the newer American meteorological textbooks. If he desires to acquaint himself with the climatic conditions of the region which he plans to visit, he will do well to consult the standard work on local climate. In this he will find mention of important local phenomena which may be especially worthy of attention and further observation.

The present subject may be considered under two heads: (1) Non-instrumental, and (2) instrumental observations.

Non-instrumental observations.—Many travelers feel that unless they can keep up a complete series of standard meteorological records, with a considerable and superior instrumental equipment, it is not worth while to attempt any observations whatever. This is by no means the case. Even such irregular notes as may be made by a traveler on a train, on horseback, on foot, or on shipboard are often of real interest. A few careful non-instrumental observations, especially if made regularly, are often of more value, even to meteorologists, than any number of careless and inaccurate instrumental records. Even in the most elaborate meteorological records, many weather elements are always observed non-instrumentally.

The hours of observation preferably should be about 7 a. m., 2 p. m., and 9 p. m. to get a general summary of the character of a day. Temperature observations such as chilly, muggy, exhilarating, depressing, mild, excessively hot, etc., are well worth recording, as they give a human picture of the weather not easily obtainable from the other observations. Wind observations on the basis of the Beaufort scale and eight points of the compass are most satisfactory. Special winds such as mountain and valley breezes are worth particular mention. Cloud observations involve particularly the amount of cloudiness, the kinds and the directions from which the clouds move. The records can be made to show the tenths or thirds of the sky covered, the general thickness of the clouds, and particular features of the cloudiness best covered in a brief description. Non-instrumental rainfall observations may be made by describing the intensity of the falling rain; or, if the rainfall is not observed, by noting the condition of the countryside in general, especially as regards vegetation. All sorts of miscellaneous phenomena, when recorded, complete the weather record.

Instrumental observations.—The extent of his instrumental equipment will be determined by the interest, time, and means of each traveler. In the following sections reference is made only to the simple equipment which the average man will probably be able to take. Those who wish to give more time to this subject should consult the standard scientific guides for travelers and the instructions in the use of the various instruments, published by the United States Weather Bureau. Whatever be the equipment, care should be taken to secure good instruments. It is essential that the traveler should familiarize himself with their use before he starts on his journey.

The sling psychrometer is the most convenient type of thermometer and humidity instrument. Aneroid barometers are the most handy for pressure measurements, and will serve not only for local weather forecasting but also for altitude determination. A small rain-gauge may be carried and is frequently of considerable use, especially if travel is not performed on rainy days. Other instruments which may be taken with the traveler are barograph, pocket nephoscope, portable anemometer, and an instrument for determining the true direction and velocity of the wind at sea.

Two pages at the end of the chapter show where instruments may be obtained and their approximate prices, and give references to four textbooks, two scientific guide books, special instructions in the use of instruments, and meteorological tables.—C. F. B.

SOME ECONOMIC EFFECTS OF THE MILD WINTER, 1918–19.

A year ago so much was being written on the effects of the extremely severe winter of 1917–18 that it seems appropriate to make some mention of the economic effects of the extraordinarily mild winter of 1918–19 in the eastern United States.[1] It is unnecessary more than to mention the great saving of coal which resulted from the

[1] The meteorological conditions inducing this mild weather have been discussed in the MONTHLY WEATHER REVIEWS for the different months, and especially by E. H. Bowie, in the January, 1919, REVIEW, pp. 45–46, 2 plates.

mild weather; and the generally favorable effect on vegetation, especially the winter grains.[2] The saving in transportation costs, while very great, is not so generally realized because ice and snow interruptions to transportation and the destruction of perishable foodstuffs by cold weather are thought of as unfortunate occurrences. Thus the lack of these may be hardly noticed.

The following excerpts from an extended article "Millions saved on mild winter," published in the New York Times, April 6, 1919 (sec. 2, p. 2) give some of the details of the saving which resulted from uninterrupted traffic in a great metropolis and elsewhere:

"The money saving of a mild winter benefits the shippers, the wholesale and retail dealers, the truckmen, who are able to maintain good deliveries, and the householders, whose coal bills decreased.

"The winter of 1917–18 and that of 1918–19 were two extremes and for that reason the comparison shows a more pronounced saving. * * * New York City Street Cleaning Department records show that in the 1916–17 winter there were 46.2 inches of snow to contend with, and 7,879,824 cubic yards were removed at a cost of $1,127,018, while in the 1917–18 winter, although there were only 22 inches of snow and 5,902,910 cubic yards were removed, the cost of removal was $2,676,603. This was due to ice. * * *

"Snow removal with the railroads is not a local but a country-wide problem. When it is mild in one part of the country, in another the railroad men may be fighting drifts and meeting the handicap of frozen switches. Removing snow and ice in an ordinary winter costs between $5,000,000 and $6,000,000, and in the winter of 1917–18 it was perhaps $1,500,000 more. In the winter just ended the cost was far below the cost of an ordinary winter. A man connected with the traffic management of one of the big railroad companies estimated that a mild winter will show a saving of 25 per cent on the figures given, and in an extremely mild season, such as the winter just ended, there should be a saving of fully 50 per cent on the figures given. * * *

"In estimating the saving on an open winter, such as that just ended, there must be reckoned the saving that came to New York through the uninterrupted flow of freight in and out of this city.

" * * * Coal that in 1917–18 came to the coal ports solidly frozen in the cars had to be steamed out, sometimes to freeze again before it could be dumped into barges, flowed out last winter as freely as it does in June, and there was no need of the elaborate steam sheds that had been added to the railroad equipment in anticipation of another hard winter and a continuation of the wartime demand."—C. F. B.

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C. FITZHUGH TALMAN, Professor in Charge of Library.

The following have been selected from among the titles of books recently received as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies:

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[2] See more detailed discussions in the REVIEW, 1918, November, pp. 537-538, December, p. 599; 1919, January, p. 52, February, p. 130, March, p. 192